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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 101927/9	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/CA 03/01812	International filing date (day/month/year) 24.11.2003	Priority date (day/month/year) 22.11.2002
International Patent Classification (IPC) or both national classification and IPC A23J1/14		
Applicant MCN BIOPRODUCTS INC. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 6 sheets.

3. This report contains Indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(II) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 17.06.2004	Date of completion of this report 24.02.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Fourgeaud, D Telephone No. +49 89 2399-7047 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/CA 03/01812**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1, 2, 4-11, 13, 15-21 as originally filed
3, 12, 14 filed with telefax on 04.10.2004

Claims, Numbers

1-11 as originally filed
12-23 filed with telefax on 04.10.2004

Drawings, Sheets

1/3, 2/3 as originally filed
3/3 filed with telefax on 04.10.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-11
	No: Claims	12-23
Inventive step (IS)	Yes: Claims	
	No: Claims	1-11
Industrial applicability (IA)	Yes: Claims	1-23
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA 03/01812

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1: WO 01/87083 A (MAENZ DAVID D ;NEWKIRK REX W (CA); CLASSEN HENRY L (CA); TYLER ROB) 22 November 2001 (2001-11-22)

1.1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

1.2. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document) a process for extracting proteins from an oilseed starting material, whereby said material is firstly mixed with an aqueous solvent, preferably with water, then the protein containing extract is separated from the remaining solids by filtration, and finally the aqueous extract is treated with a phytase enzyme (see claim 1).

1.3.1. D1 further discloses an example of extraction, in which canola flakes are mixed with water and extracted (example 1, pages 18-19); the mixture obtained is at the beginning of the process passed through a compression belt filter press, and the presscake is extracted again. After a new extraction, the presscake is mixed with water for a further extraction, and then is passed through a dewatering screw press. Accordingly, the following steps are carried out in D1: extraction-filtration with compression belt means - extraction - filtration with screw press means.

1.3.2. The question is then to know if a screw press filter can be considered as being an impeller-type filter.

According to the Oxford English Dictionary online (<http://dictionary.oed.com/>), an impeller is a part of a machine or apparatus designed to impart motion to a fluid by rotation, especially in a restricted space (e.g a centrifugal pump or compressor).

A screw gives a rotation movement to the material; consequently it is considered that a

screw press filter falls within the meaning of an "impeller-type filter". The terms "impeller-type filter" or "impeller filtration" do not define precisely what is intended to be protected (Article 6 PCT).

1.4. The subject-matter of claim 1 therefore differs from this known process in that present claim 1 firstly carries out the mixing of the flakes with water, then filters the solid residue with a screw press means i.e. an impeller-type filter (see precedent paragraph), and dewateres the new residue by compression filtration means. Then the steps of the process already disclosed in D1 are only inverted in claim 1 of the present application.

If it can be understood from the description of the present application that the aim of the first filtering step by use of a so-called impeller-type filter is to produce a moist residue (page 11, line 3), which should then be treated by compression filtration means, this essential feature does not clearly appear in present claim 1 (Article 6 PCT).

1.5. The problem to be solved by the present invention may therefore be regarded as to propose an alternative process to the one described in D1.

1.6. The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) since said solution only consists in modifying the order of the steps of the process of D1. Whereas in D1 after mixing of the material with water, the mixture is filtered with compression means and in an example (example 1) further dewatered by a screw press means, in claim 1 of the present application, the mixture is firstly filtered with an impeller-type filter i.e. for example a screw press filter, then the cake is dewatered by compression filtration means. Such a modification of the process disclosed in D1 cannot involve an inventive step in the sense of Article 56 EPC.

1.7. Dependent claims 2-11 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, see document D1 and the corresponding passages cited in the search report.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. ... PCT/CA 03/01812

2.1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 12 is not new in the sense of Article 33(2) PCT.

2.2. Considering the above argumentation, the mentioned lack of clarity (Article 6 PCT) of the term "impeller filtration", and example 1 of D1 (the references in parentheses applying to this document), a separation apparatus providing means for mixing the material with water (a ribbon blender), compression filter means (compression belt filter press) and an impeller type filter (a screw press) is already disclosed in this prior art document.

Consequently, the subject-matter of claim 12 of the present application is not novel over the disclosure of D1.

defatted canola flake), some small particles of cell meat may be present. These are high in protein, and are therefore especially valuable to recover.

5 In the case of a thick viscous starting slurry of vegetable material, such as a slurry of oil-extracted canola flakes, obtaining efficient extraction of liquid plus light phase solids has certain difficulties. Compression-based filtration can be used to obtain an extract containing light phase solids. In this process the slurry is pressed with a filter media having pore openings or aperture sizes that
10 permit passage of the light solid phase in the slurry, while retaining the heavy solids as an extracted presscake. An example of this type of process is shown in PCT Published Applications WO 01/87083 and WO 03/047438 of Maenz et al. However, the thick viscous nature of the slurry results in
15 compacting of the filter media, poor separation per unit area of filter media and considerable extrusion of slurry from the sides of the filter media. Therefore, direct processing of a viscous slurry of vegetable material by compression filtration as described in the PCT published application requires extensive filtration area and
20 slow process rates. Substantial equipment is required, which drives up the cost of production.

Wills et al USP 5814230 describes a process and apparatus for the separation of coarse and ultrafine solids from a liquid stream. In this process multiple filter screens of various pore opening
25 sizes are passed repeatedly through the solids containing feed suspension until a filter cake builds up on the surface of the screens and a clarified solids-free liquid phase is generated. The solids are subsequently discharged from the screen and dewatered by means such as vibration and direct blasts of air or
30 by compression-based dewatering. The multiple screens of

in cross sectional area available to material passing through the passage increases pressure on the material and causes liquid to be expelled from the screw press across filter media 73 that is disposed along a length of the interior of the screw press. The liquid is directed along passage 75 from which it can be directed to container 35 of Figure 1. At the end of the filter the residue 103 has been compressed and extrudes from the filter via passage 76 as a presscake which can be directed into bin 41 of Figure 1.

Figure 2 shows a variant of Figure 1. In Figure 2, like numerals indicate like portions to Figure 1. Instead of a belt press 30, the embodiment of Figure 2 has a piston press 50. The piston press 50 has a compression chamber 51, with an end formed from mesh 52. Suitably compression chamber 51 is a cylinder, but it may be of other shapes if desired, provided the piston fits within it to compress the residue 103. Moist residue 103 is moved (for example by a conveyer belt 29), into compression chamber 51, where it rests against mesh end 52. When the cylinder is sufficiently filled with a discrete portion of the moist residue 103A, the supply of residue is interrupted. This can be done by directing conveyor 29 to a holding vessel (not shown) or by turning off the auger 22, so that no material is put onto conveyor belt 29.

Piston 53 is then caused to descend into compression chamber 51, compressing the residue 103 and squeezing it, to press out liquid 104. This liquid is collected in a vessel 35. The piston 53 is then withdrawn, and the compressed residue is removed as a presscake 105A. This is advanced on a suitable conveyor belt 42 to a knife 40, where it is cut into pieces, which fall into bin 41 to form product 106A. Product 106A from this embodiment is essentially the same as product 106 from the first embodiment discussed above, except that, depending upon the pressure

conveyor belt 29 to be passed to the second stage. The contents are a moist residue 103B.

In the embodiment shown in Figure 3, the second stage filtration is a batch filter centrifuge shown generally as 80. The centrifuge has a central axle 81, driven by a motor 82. The axle supports an arm 83 with a separating vessel (shown in section) on the end. The separating vessel is shown at 84 in one position and at 84A (in dashed lines) in a second position. Hinged access means, (not shown) permits access to the separating vessel. In operation, the separating vessel (originally in the position shown by dashed lines 84A) is charged with moist residue 103B, as is shown schematically by arrow 91. The centrifuge is operated to separate liquid from the residue. The centrifuge is then stopped, with the separating vessel, for example, in the position 84 delineated by solid lines. The moist residue 103B has separated into a solid 105B (which is generally similar to solid presscake 105) and liquid 104. Liquid 104 and solid 105B are removed from the centrifuge as shown by arrows 95 and 96, respectively. Solid 105B can be cut with knife 40 to make pieces 106B, similar to pieces of product 106 or 106A in the previous embodiments.

A continuous centrifuge can be used instead of the batch centrifuge shown.

In each of the embodiments described, liquid 104 is high in protein. It can be used directly as a food or animal feed or mixed with liquid 101 (and entrained cell meats 102) for direct use as a food or animal feed. Alternately, to reduce the water needs of the process, liquid 104 can be used as the liquid feed to the first stage instead of water 2, or mixed with some water 2 for makeup. This is shown by dashed arrows 110 and 111 respectively. If

12. Separation apparatus for treating a solid product with water soluble components, which comprises in combination:

5 (a) means for mixing the product with water to form a slurry;

(b) an impeller type filter to separate the slurry into a filtrate and a moist retentate; and

10 (c) compression filter means to remove further water from the moist retentate.

13. The apparatus of claim 12 wherein said impeller type filter comprises a tubular filter media housing an auger impeller closely
15 fitting to the filter media.

14. The apparatus of claim 12 wherein said impeller type filter comprises a vessel including a filter media forming a portion of the vessel boundary and an impeller disposed for movement
20 within the vessel closely fitting to said portion..

15. The apparatus of claim 13 or 14 wherein said filter media is a mesh.

25 16. The apparatus of any of claims 13-15 in which the filter media has apertures which permit passage of fine particles comprising at least one of protein and carbohydrate.

17. The apparatus of any of claims 13-16, wherein said filter
30 media has a minimum aperture of about 75 microns.

18. The apparatus of any of claims 13-16, wherein said filter media has a minimum aperture of about 150 microns.

19. The apparatus of any of claims 13-18, wherein said filter media has a maximum aperture of about 2500 microns.

20. The apparatus of any of claims 13-18, wherein said filter media has a maximum aperture of about 250 microns.

21. The apparatus of any of claims 12-20, wherein said compression filter means comprises at least one pair of filter belts which are oriented so as to convey the solid residue while gradually and progressively compressing the solid residue in the direction of movement of the solid residue between the pair of filter belts.

22. The apparatus of any of claims 12-20 wherein the compression filter means comprises a screw press.

23. The apparatus of any of claims 12-20 wherein said compression filter means comprises a compression chamber, a portion of which is bounded by filter media and a piston adapted to be received within the compression chamber to compress solid residue within the compression chamber against the filter media.

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